We claim:

1. A method for use in a system that is adapted to transmit a data burst over at least two antennas, the method comprising the step of:

transmitting at least two training sequences, each of the at least two training sequences being transmitted over a different respective antenna,

each of the at least two training sequences having a normalized auto-correlation below an auto-correlation threshold, the auto-correlation threshold being significantly less than unity, and

each pair of the at least two training sequences having a normalized cross-correlation below a cross-correlation threshold, the cross-correlation threshold being significantly less than unity.

2. The method of claim 1, wherein each of the at least two training sequences having the normalized auto-correlation below the auto-correlation threshold comprises a sum of the squares of a normalized auto-correlation of one of the at least two training sequences over an auto-correlation window being below the auto-correlation threshold.

3. The method of claim 1, wherein each pair of the at least two training sequences having the normalized cross-correlation below the cross-correlation threshold comprises a sum of the squares of a normalized cross-correlation of the pair of the at least two training sequences over a cross-correlation window being below the cross-correlation threshold.

4. The method of claim 1, wherein the auto-correlation threshold is .06.

5. The method of claim 1, wherein the cross-correlation threshold is .12.

6. The method of claim 1, wherein:

the normalized auto-correlation is an auto-correlation normalized by the number of symbols in one of the training sequences, and

the normalized cross-correlation is a cross-correlation normalized by the number of symbols in one of the training sequences.

7. The method of claim 1, wherein the system exhibits frequency selective fading.

8. The method of claim 1, wherein:

the data burst includes a plurality of sub-streams, each sub-stream representing different bits than the other sub-streams of the plurality of sub-streams; and

at a particular time each of at least two of the sub-streams are transmitted over a different respective antenna of the at least two antennas.

9. The method of claim 1, wherein the cross-correlation is taken over a cross-correlation window of -L+1 to 0 and 0 to L-1, L being the number of symbols over which multipaths of significant power can arrive.

10. The method of claim 1, wherein the auto-correlation is taken over an auto-correlation window of -L+1 to L-1, excluding 0, L being the number of symbols over which multipaths of significant power can arrive.

11. The method of claim 1, wherein:

the system is adapted to transmit a plurality of data bursts; and

the transmitting step is repeated for each data burst.

12. A method for use in a system that is adapted to transmit a data burst over at least two antennas, the method comprising the step of:

transmitting at least two training sequences, each of the at least two training sequences being transmitted over a different respective antenna,

the training sequences being shifted versions of each other,

with each cyclic sequences having a normalized cyclic-auto-correlation below a cyclic-auto-correlation threshold, each cyclic sequence being N', N'=N-L+1, symbols of one of the at least two training sequences, the cyclic-auto-correlation threshold being significantly less than unity, L being the number of symbols over which multipaths of significant power can arrive, and N being the number of symbols in one of the training sequences.

13. The method of claim 12, wherein each cyclic sequence having the normalized cyclic-auto-correlation below the cyclic-auto-correlation threshold comprises a sum of the squares of a normalized cyclic-auto-correlation of one of the cyclic sequences over a cyclic-auto-correlation window being below the cyclic auto-correlation threshold.

14. The method of claim 12, wherein the cyclic-auto-correlation threshold comprises .2.

15. The method of claim 12, wherein the normalized cyclic-auto-correlation is a cyclic-auto-correlation normalized by N'.

16. The method of claim 12, wherein the system exhibits frequency selective fading.

17. The method of claim 12, wherein:

the data burst includes a plurality of sub-streams, each sub-stream representing different bits than the other sub-streams of the plurality of sub-streams; and

at a particular time each of at least two of the sub-streams are transmitted over a different respective antenna of the at least two antennas.

18. The method of claim 12, wherein:

the system is adapted to transmit a plurality of data bursts; and

the transmitting step is repeated for each data burst.

19. A method for use in a system that is adapted to transmit a data burst over at least two antennas, the method comprising the step of:

transmitting at least two training sequences, each of the at least two training sequences being transmitted over a different respective antenna,

a trace of an inverse of a product of a matrix of symbols of the at least two training sequences and a conjugate transpose of the matrix is below a trace threshold,

the trace threshold being below 5ML/(N-L+1), L being the number of symbols over which multipaths of significant power can arrive, M being the number of training sequences, and N being the number of symbols in one of the training sequences.

20. The method of claim 19, wherein the trace threshold is 1.2ML/(N-L+1).

21. The method of claim 19, wherein the matrix is a function of at least one of the following:

the number of symbols over which multipaths of significant power can arrive;

the number of training sequences; and

the number of symbols of one of the training sequences.

22. The method of claim 19, wherein matrix is a block-toepliz matrix.

23. The method of claim 22, wherein the block-toepliz matrix includes:

M blocks, M being the number of training sequences,

each block having L columns, L being the number of symbols over which multipaths of significant power can arrive, and

each block having N-L+1 rows, N being the number of symbols in one training sequence.

24. The method of claim 19, wherein the system exhibits frequency selective fading.

25. The method of claim 19, wherein:

the system is adapted to transmit a plurality of data bursts; and

the transmitting step is repeated for each data burst.

26. A transmitter adapted to be coupled to at least two antennas,

the transmitter being further adapted to transmit at least two training sequences, each of the at least two training sequences being transmitted over a different respective antenna,

each of the at least two training sequences having a normalized auto-correlation below an auto-correlation threshold, the auto-correlation threshold being significantly less than unity, and

each pair of the at least two training sequences having a normalized cross-correlation below a cross-correlation threshold, the cross-correlation threshold being significantly less than unity.

27. The transmitter of claim 26, wherein each of the at least two training sequences having the normalized auto-correlation below the auto-correlation threshold comprises a sum of the squares of a normalized auto-correlation of one of the at least two training sequences over an auto-correlation window being below the auto-correlation threshold.

28. The transmitter of claim 26, wherein each pair of the at least two training sequences having the normalized cross-correlation below the cross-correlation threshold comprises a sum of the squares of a normalized cross-correlation of the pair of the at least two training sequences over a cross-correlation window being below the cross-correlation threshold.

29. The transmitter of claim 26, wherein the auto-correlation threshold is .06.

30. The transmitter of claim 26, wherein the cross-correlation threshold is .12.

31. The transmitter of claim 26, wherein the transmitter is adapted for use in a system having frequency selective fading.

32. The method of claim 26, wherein:

the normalized auto-correlation is an auto-correlation normalized by the number of symbols in one of the training sequences, and

the normalized cross-correlation is a cross-correlation normalized by the number of symbols in one of the training sequences.

33. The transmitter of claim 26, wherein the cross-correlation is taken over a window of -L+1 to 0 and 0 to L-1, L being the number of symbols over which multipaths of significant power can arrive.

34. The transmitter of claim 26, wherein the auto-correlation is taken over a window of -L+1 to L-1, excluding 0, L being the number of symbols over which multipaths of significant power can arrive.

35. A method for use in a system that is adapted to transmit a data burst over at least two antennas, the data burst including a plurality of sub-streams, each sub-stream representing the same bits as the other sub-streams of the plurality of sub-streams, at a particular time at least two of the sub-streams are transmitted over different respective antennas of the at least two antennas, there being a delay between the transmission of the sub-streams from one sub-stream to another sub-streams, the method comprising the step of:

transmitting at least two training sequences, each of the at least two training sequences being transmitted over a different respective antenna,

the training sequences being identical to each other.